



THE STATE
of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Fish and Game

DIVISION OF SPORT FISH

333 Raspberry Road
Anchorage, AK 99518
Main: 907-267-2218
Fax: 907-267-2424

P.O. Box 110024
Juneau, AK 99811-0024
Main: 907-465-4270
Fax: 907-465-2034

3298 Douglas Place
Homer, AK 99603
Main: 907-235-8191
Fax: 907-235-2448

October 20, 2022

Jason Janot
International Pacific Halibut Commission
2320 West Commodore Way
Salmon Bay, Suite 300
Seattle, WA 98199-1287

Dear Dr. Janot:

This letter represents our report on the Alaska recreational halibut fishery in support of the annual IPHC stock assessment. This year's letter provides:

1. Final 2021 estimates of sport fishery harvest and yield by IPHC regulatory area,
2. Preliminary 2022 estimates of harvest and yield by IPHC area,
3. Final 2021 and preliminary 2022 estimates of sport fishery release mortality by IPHC area, and
4. Final 2021 estimates of sport fishery yield prior to the mean IPHC longline survey date in Areas 2C and 3A.

Each section includes a summary of the methods used and basic results. More detailed information on methods can be found in the following project operational plans:

Southeast Region creel sampling: <http://www.adfg.alaska.gov/FedAidPDFs/ROP.SF.1J.2022.04.pdf>

Southcentral Region creel sampling: <http://www.adfg.alaska.gov/FedAidPDFs/ROP.SF.2A.2022.12.pdf>

Statewide halibut estimation: <http://www.adfg.alaska.gov/FedAidPDFs/ROP.SF.4A.2020.04.pdf>

We hope this information satisfies the IPHC's needs. Please feel free to contact us if you require clarification or additional information.

Sincerely;

(sent via email)

Brianna King, Sarah Webster, Mike Jaenicke, Diana Tersteeg, Martin Schuster, and Marian Ford

Final Estimates of 2021 Sport Harvest and Yield

In Fall 2021 we provided preliminary estimates of the 2021 sport harvest for Areas 2C, 3A, 3B, and 4. This letter provides final estimates of the 2021 sport harvest based on Alaska Department of Fish and Game (ADF&G) saltwater logbook data and final estimates from the ADF&G Statewide Harvest Survey (SWHS). The final estimates for Area 2C and 3A will also be posted on the North Pacific Fishery Management Council web site.

The Area 2C charter fishery regulations for 2021 included a one-fish daily bag limit and reverse slot (or “protected slot”) limit that allowed harvest of halibut less than or equal to 50 inches and halibut greater than or equal to 72 inches. The Area 3A charter regulations included a two-fish bag limit with a maximum size of one fish of 32 inches, a limit of one trip per charter vessel per day (on which halibut are harvested), a limit of one trip per Charter Halibut Permit (CHP) per day, and a closure of halibut retention on all Wednesdays. Charter captains and crew were not allowed to retain halibut while guiding clients in Area 2C or Area 3A under regulations of the North Pacific Fishery Management Council’s Catch Sharing Plan (CSP) for these Areas. Charter fishery regulations in the remainder of the state included a daily bag limit of two fish of any size, and there was no prohibition on retention of halibut by captains or crew. Unguided fisheries statewide were managed under a bag limit of two fish of any size.

Methods:

For Areas 2C and 3A, sport fishery yield was calculated separately for the charter and unguided sectors as the product of the number of fish harvested and average weight of harvested halibut. Yield estimates do not include release mortality (provided later in this document). Estimates were done for six (unguided) subareas in Area 2C and eight (charter) and seven subareas (unguided) in Area 3A and summed. Charter harvest was based entirely on logbook data, per the provisions of the CSP. Unguided harvest was estimated through the SWHS. Standard errors of the SWHS estimates for the unguided sector were obtained by bootstrapping. Average net weight was estimated by applying the IPHC length-weight relationship to length measurements of harvested halibut sampled at major ports in Areas 2C and 3A. All fish from each vessel-trip selected for sampling were measured. Bootstrapping was used to estimate the standard errors of average weight. The estimates of charter average weight for Homer, Seward, and Whittier were stratified to account for differences in sizes of halibut cleaned at sea and cleaned in port. There were no samples from the charter sector in the 3A portion of the Glacier Bay area (SWHS Area G) due to the absence of a port sampler in Elfin Cove in 2021, so the Yakutat area (SWHS Area H) average weight from the charter fishery was substituted for this area; Yakutat was the nearest port in Area 3A from which samples were obtained. All unguided harvest in the Glacier Bay subarea was assumed to have occurred in Area 2C. Charter-caught halibut taken under a Guided Angler Fish (GAF) permit from the National Marine Fisheries Service were not included in charter harvest calculations because the CSP specifies that this harvest accrues toward the commercial catch limit and is counted against IFQ.

Final estimates of sport fishery yield for Areas 3B and 4 are for the charter and unguided sectors combined and are based entirely on the SWHS. Because ADF&G does not sample the sport harvest in these areas, we followed past practices of the IPHC and used the average weight of Kodiak sport harvest as a proxy for average weight in Areas 3B and 4. Specifically, we used the average weight from the unguided sector because it was unaffected by size limits. Even so, use of the Kodiak average weight may bias the yield estimates for these Areas.

As has been done historically, harvest from SWHS Area R (Alaska Peninsula and Aleutian Islands south of Cape Douglas) was apportioned to IPHC Areas 3B and 4 using specific locations reported in the survey. In some years, Area R harvest estimates have included harvests for sites that are actually in Area 3A. Since 1991, the estimated harvest of Area 3A halibut included in Area 3B estimates has ranged from 0 to 728 fish per year (average = 108). In 2021, no halibut were estimated from Area 3A locations in Area R.

Results:

The 2021 Area 2C estimated sport harvest (excluding release mortality) was 143,167 fish, for a yield of 2.292 million pounds (Table 1). Charter yield represented 49% of the total. Average net weight was estimated at 16.01 lb overall and was lower for the charter sector due to size limit restrictions. Average weight was estimated from samples of 3,870 charter halibut and 3,484 unguided halibut.

The Area 3A estimated sport harvest was 279,794 fish, for a yield of 3.815 Mlb (Table 1). The charter sector accounted for 64% of the total yield. Average net weight was estimated at 13.64 lb overall and was slightly lower for the charter sector. Average weight was estimated from samples of 4,096 charter halibut and 1,659 unguided halibut.

The final estimates of charter halibut yield were about 0.83% higher than last year's preliminary estimate in Area 2C and 0.04% higher in Area 3A. The final estimates of unguided yield were 8.6% higher than the preliminary estimates in Area 2C and 11.2% lower in Area 3A. The preliminary estimates were derived from exponential time series forecasts (SAS ESM procedure) for the unguided sector.

The final harvest estimates for western areas were 769 halibut in Area 3B and 78 halibut in Area 4 (Table 1). Applying the Kodiak unguided average weight of 14.23 lb resulted in yield estimates of 0.011 Mlb in Area 3B and 0.001 Mlb in Area 4. The final estimate for 3B is up from last year's preliminary estimates of 0.006 and down from last year's estimate of 0.011 Mlb in Area 4.

Preliminary 2022 Estimates of Harvest and Yield

Methods:

Sport charter fishery mortality for Areas 2C and 3A is based on numbers of halibut reported harvested and released in ADF&G charter logbooks. Harvest and release estimates from the SWHS are used for all unguided fishery estimates in 2C and 3A as well as total sport fishery estimates for Areas 3B and 4. Neither complete logbook data nor SWHS estimates are available yet for the current year, and creel sampling is not designed to produce estimates of harvest. A variety of methods were used to provide preliminary estimates of the numbers of fish harvested by each sector and Regulatory Area.

The Area 2C charter fishery regulations for 2022 included a one-fish daily bag limit and reverse slot (or "protected slot") limit that allowed harvest of halibut less than or equal to 40 inches and halibut greater than or equal to 80 inches. The Area 3A charter regulations included a two-fish bag limit with a maximum size of one fish of 28 inches, a limit of one trip per charter vessel per day (on which halibut are harvested), a limit of one trip per Charter Halibut Permit (CHP) per day, and a closure of halibut retention on all Wednesdays and two Tuesdays (July 26th and August 2nd). Charter captains and crew were not allowed to retain halibut while guiding clients in Area 2C or Area 3A under regulations of the North Pacific Fishery Management Council's Catch Sharing Plan (CSP) for these Areas. Charter fishery regulations in the remainder of the state included a daily bag limit of two fish of any size, and there was no prohibition on retention of halibut by captains or crew. Unguided fisheries statewide were managed under a bag limit of two fish of any size.

Electronic logbooks (eLogbooks) were mandatory throughout 2C in 2022. As such, harvest reported in eLogbooks through October 12th was used to estimate preliminary harvest and was corrected for late pages, edits, and additional harvest based on 2021 proportion of total harvest that had been submitted in 2C by October 2021 relative to finalized 2021 data. Charter harvest for 3A was projected from partial-year logbook data. The majority of operators in 3A still use paper logbooks and there was no mandate to use eLogbook in most of 3A in 2022. Logbook data were entered and available in mid-October for most trips taken through August 31 and this was used to project harvest for the year in 3A. Harvest data through August were corrected to account for late logbook submissions and other reporting errors based on past data. This adjusted the harvest in each area by less than 2%. The harvest data were then expanded by forecasting the proportion of harvest taken through August in each subarea. Forecasts and their standard errors were obtained from a simple exponential smoother using 2006-2019 and 2021 logbook data. Data from 2020 were omitted from forecasts due to the unusual timing of the fishery caused by the COVID-19 pandemic.

Unguided harvest in Areas 2C and 3A, and overall sport harvests for Areas 3B and 4 were projected from the existing time series of SWHS estimates using simple exponential smoother forecasts. Data from 2020 were omitted from unguided forecasts in 2C and 3A due to the reduced effort caused by the COVID-19 pandemic in those Areas.

For both sectors in Areas 2C and 3A, preliminary harvest at the subarea level was used to estimate yield. Charter and unguided yield were estimated by multiplying the subarea estimated harvest by the corresponding estimates of

average weight. Average weights were estimated by applying the updated IPHC length-weight relationship to length measurements of harvested halibut obtained through sampling of the recreational harvest. No sampling was conducted in Areas 3B or 4 in 2022, so the Kodiak area average weight from the unguided fishery was again substituted for these Areas.

Results:

The preliminary estimate of 2022 sport halibut harvest in Area 2C (excluding release mortality) was 146,657 halibut, or 1.932 MIb (Table 2). Average weight was estimated at 13.18 lb. The charter average weight was 7.91 lbs lower than the unguided average weight due to the charter fishery size limit. Average weights for Area 2C were estimated from samples of 4,769 charter halibut and 4,310 unguided halibut.

The preliminary estimate for Area 3A was 265,651 halibut, for a total sport fishery yield of 2.942 MIb (Table 2). Charter harvest was estimated using a projection that 94% of the harvest was taken through the end of August. The estimated average weights in Area 3A was 11.08 lb overall. Average weights were estimated from samples of 4,807 charter and 2,143 unguided halibut.

The preliminary harvest estimates for 2022 were 680 halibut in Area 3B and 521 halibut in Area 4. Applying the unguided average weight of 11.04 lb from Kodiak resulted in yield projections of 0.008 TMIb in Area 3B and 0.006 MIb in Area 4 (Table 2). Although the levels of sport harvest are low, there is large uncertainty in the time series forecasts as well as use of the Kodiak unguided average weight as a proxy for average weight in these areas.

Final 2021 and Preliminary 2022 Estimates of Release Mortality

Methods:

Release mortality (R) was calculated in pounds net weight for each subarea of Areas 2C and 3A as:

$$R = \hat{N} \cdot DMR \cdot \hat{w}$$

where

\hat{N} = the number of fish released,

DMR = the assumed short-term discard mortality rate due to capture, handling, and release, and

\hat{w} = the estimated average net weight (in pounds) of released fish.

The numbers of halibut released (\hat{N}) in the charter sector in 2021 were based on final logbook data. The numbers of halibut released in 2022 used eLogbook data through October 12th, adjusted for late pages, errors, and late season releases in 2C and were projected using logbook data through August 31 in 3A and did not include 2020 data. The projections used simple exponential forecasts of the proportion of releases through August 31 from 2006-2019 data. For the unguided fishery and the overall sport fisheries in Areas 3B and 4, the estimated number of fish released in each subarea in 2021 was obtained from the SWHS. The projections for 2022 were simple exponential time series forecasts using previous release numbers from the SWHS and did not include 2020 data.

Assumed mortality rates ($DMRs$) were 5% for Area 3A charter-caught halibut, 6% for Area 2C charter and Area 3A unguided, and 7% for Area 2C unguided halibut. These rates were developed by assuming a 3.5% mortality rate for halibut released on circle hooks and a 10% mortality rate for halibut released on all other hook types. The hook type data were collected in 2007 and 2008 in Area 2C, and every year since 2007 in Area 3A. These rates were applied to the reported number of fish released on each hook type to calculate a weighted mean mortality rate for each user group in each subarea. These weighted mean rates were then rounded up to the next whole percentage point to address uncertainty and account for possible cumulative effects of multiple recaptures. A discard mortality rate of 6% was assumed for Areas 3B and 4, as no data on hook use were collected.

The average weights of released fish in each subarea were estimated using a logistic model of the proportion of catch retained at length, as described in the operational plan for statewide halibut estimation (see cover page for

link). The model uses the length composition of the retained fish to infer the length distribution of released fish and average weight was calculated using the updated IPHC length-weight relationship.

For the Area 2C charter fishery, additional steps were needed to estimate release mortality due to the reverse slot limits in place in 2021 and 2022. This required partitioning the released fish into size categories as follows: the 2021 size classes were U50 (≤ 50 inches), 50-72, and O72 (≥ 72 inches); the 2022 size classes were U40 (≤ 40 inches), 40-80, and O80 (≥ 80 inches)). The proportions of fish in each size class were obtained from creel survey interviews where anglers were asked to report the numbers of released fish by size class. The average weight of released fish in the U50 (2021) or U40 (2022) size class was estimated using the model described above. The average weights of released fish in the protected slot and above the upper limit were estimated as the average weight of fish in these size ranges in 2010, the most recent year without a charter size limit.

The North Pacific Fishery Management Council's Scientific and Statistical Committee reviewed the logistic modeling approach in 2007 and concluded that it provided "reasonable" estimates of average weight given the lack of data. One problem inherent in this method is that the size distribution of released fish is truncated at the size of the smallest fish measured in the harvest sample. It is likely that some halibut are released that are smaller than the smallest halibut retained and measured. Therefore, the method may in effect underestimate the numbers of small fish released but overestimate average weight. Because the model assumes that the percent of fish kept at length never exceeds 95%, it may also overestimate the numbers of large fish released, but probably has little effect on their average weight.

Results:

For 2021, estimated release mortality was 0.057 Milb in Area 2C, with 0.035 Milb from the charter fishery (Table 3). The size class breakdown of the Area 2C charter release mortality indicated that the majority of fish and the majority of poundage released were in the U50 category (Table 4). Estimated release mortality in Area 3A was 0.038 Milb, with 0.017 Milb from the charter fishery (Table 3). Areas 3B and 4 each had negligible amounts of release mortality from the sport fishery.

For 2022, estimated release mortality was 0.052 Milb in Area 2C, 0.033 Milb in Area 3A, and virtually zero in Areas 3B and 4 (Table 5). The size class breakdown of the Area 2C charter release mortality indicated that the majority of fish released were in the U40 length range and the poundage of release mortality was greatest in the O40-U80 size range (Table 4).

The 2021 total sport fishery removals, including harvest and all sizes of release mortality, was 2.349 Milb in Area 2C and 3.853 Milb in Area 3A. Release mortality made up 2.4% of all Area 2C removals and 1.0% of Area 3A removals in 2021. For 2022, the preliminary estimates of total sport removals are 1.984 Milb in Area 2C and 2.976 Milb in Area 3A. Release mortality accounted for 2.6% of Area 2C removals and 1.1% of Area 3A removals in 2022.

Final Sport Fishery Yield Prior to the Mean IPHC Survey Dates in 2021

This information is provided to aid the IPHC's adjustment to the Fishery Independent Setline Survey CPUE that is used to apportion estimated exploitable biomass among regulatory areas. The mean survey dates for 2021 were July 01 in Area 2C and July 09 in Area 3A.

Methods:

The proportions of harvest prior to the mean survey date were calculated separately for the charter and unguided sectors. For the charter sector, the proportion of harvest taken prior to the mean survey date was obtained from logbook harvest data. For the unguided sector, the proportions were calculated based on harvest reported in dockside interviews. These proportions were calculated separately for each subarea of Area 2C and 3A and weighted by the final estimated harvests in each subarea to derive the overall proportions. In 2021, there were no dockside interviews in Elfin Cove or Central Cook Inlet, so for the unguided sector the average proportion from ports with interview data was used as a proxy for Elfin Cove and the recent available 10-year average was used as a proxy for Cook

Inlet. The total sport yield taken prior to the mean survey date was calculated by multiplying the charter and unguided proportions by their respective final yields and summing.

Results:

In 2021, an estimated 0.667 Mlb of halibut were taken by the sport fishery in Area 2C prior to July 01, and an estimated 1.714 Mlb were taken in Area 3A prior to July 09 (Table 6).

Table 1. Final estimates of the 2021 sport halibut harvest (numbers of fish), average net weight (pounds), and yield (millions of pounds net weight) in Areas 2C, 3A, 3B, and 4. “NA” indicates no estimate is available.

IPHC Area	Sector	Harvest (no. fish)	Average Net Wt. (lb)	Yield (Mlb)	95% CI for Yield (Mlb)
Area 2C	Charter	77,803	14.50	1.128	1.055 – 1.201
	Unguided	65,364	17.80	1.163	0.995 – 1.332
	Total	143,167	16.01	2.292	2.123 – 2.460
Area 3A	Charter	184,441	13.21	2.437	2.270 – 2.604
	Unguided	95,353	14.45	1.378	1.155 – 1.601
	Total	279,794	13.64	3.815	3.536 – 4.094
Area 3B	Total	769	14.23 ^a	0.011	NA
Area 4	Total	78	14.23 ^a	0.001	NA

^a – No size data were available from Areas 3B and 4, so the unguided average weight from Kodiak was substituted.

Table 2. Preliminary estimates of the 2022 sport halibut harvest (numbers of fish), average net weight (pounds), and yield (millions of pounds net weight) in Areas 2C, 3A, 3B, and 4. “NA” indicates no estimate is available.

IPHC Area	Sector	Harvest (no. fish)	Average Net Wt. (lb)	Yield (Mlb)	95% CI for Yield (Mlb)
Area 2C	Charter	82,888	9.74	0.807	0.768 – 0.846
	Unguided	63,769	17.65	1.125	0.879 – 1.372
	Total	146,657	13.18	1.932	1.683 – 2.182
Area 3A	Charter	167,090	10.53	1.760	1.652 – 1.867
	Unguided	98,561	12.00	1.182	1.075 – 1.290
	Total	265,651	11.08	2.942	2.685 – 3.199
Area 3B	Total	680	11.04 ^a	0.008	NA
Area 4	Total	521	11.04 ^a	0.006	NA

^a – No size data were available from Areas 3B and 4, so the unguided average weight from Kodiak was substituted.

Table 3. Final estimates of release mortality for sport fisheries in Areas 2C, 3A, 3B, and 4 in 2021. Some columns may not appear to add correctly due to rounding.

IPHC Area	Sector	Estimated No. Halibut Released	Assumed Mortality Rate	Number Released that Died	Estimated Average Net Weight (lb)	Release Mortality (Mlb)
Area 2C	Charter	35,386	6.0%	2,123	16.55	0.035
	Unguided	38,284	7.0%	2,680	8.32	0.022
	Total	73,670		4,803	11.96	0.057
Area 3A	Charter	51,950	5.0%	2,598	6.69	0.017
	Unguided	53,652	6.0%	3,219	6.35	0.020
	Total	105,602		5,817	6.50	0.038
Area 3B	Total	78	6.0%	5	10.28	0.000
Area 4	Total	285	6.0%	17	7.46	0.000

Table 4. Breakdown of Area 2C estimates of charter release mortality by size class for 2021 (final) and 2022 (preliminary). Some columns may not appear to add correctly due to rounding.

Year	Size Class (inches)	Estimated No. Halibut Released	Assumed Mortality Rate	Number Released that Died	Estimated Average Net Weight (lb)	Release Mortality (Mlb)
2021	U50	32,008	6.0%	1,920	9.31	0.018
	O50U72	3,055	6.0%	183	72.56	0.013
	O72	323	6.0%	19	204.94	0.004
	Total	35,386	6.0%	2,123	16.55	0.035
2022	U40	29,120	6.0%	1,747	6.93	0.012
	O40U80	6,810	6.0%	409	53.77	0.022
	O80	180	6.0%	11	228.88	0.002
	Total	36,110	6.0%	2,167	16.87	0.037

Table 5. Preliminary estimates of release mortality for sport fisheries in Areas 2C, 3A, 3B, and 4 in 2022. Some columns may not appear to add correctly due to rounding.

IPHC Area	Sector	Estimated No. Halibut Released	Assumed Mortality Rate	Number Released that Died	Estimated Average Net Weight (lb)	Release Mortality (Mlb)
Area 2C	Charter	36,110	6.0%	2,167	16.87	0.037
	Unguided	32,574	7.0%	2,280	6.80	0.015
	Total	68,684		4,447	11.71	0.052
Area 3A	Charter	50,892	5.0%	2,545	5.36	0.014
	Unguided	61,790	6.0%	3,707	5.28	0.020
	Total	112,682		6,252	5.31	0.033
Area 3B	Total	259	6.0%	16	5.19	0.000
Area 4	Total	483	6.0%	29	4.65	0.000

Table 6. Estimated sport harvest prior to the mean IPHC survey dates in 2021 in Areas 2C and 3A.

Area	Mean Survey Date	Charter		Unguided		Total	
		Percent	Harvest (Mlb)	Percent	Harvest (Mlb)	Percent	Harvest (Mlb)
2C	July 01	28.6%	0.322	29.6%	0.345	29.1%	0.667
3A	July 09	41.4%	1.010	51.1%	0.704	44.9%	1.714